

WHAT IS CLAIMED IS:

1. In a plasma processing apparatus in which a workpiece is processed by creating a plasma in a processing chamber, the improvement wherein a protecting layer formed of a plasma-resistant and water-absorbing resin material is adhered and fixed to the outer surface of an article in said processing chamber by its swelling and then shrinkage to prevent electrical insulation of said plasma and said article from each other.
2. In a protecting layer for plasma processing apparatus formed on the outer surface of an article in the processing chamber of a plasma processing apparatus, the improvement wherein said protecting layer is formed of a plasma-resistant and water-absorbing resin material so as to have such a shape that the protecting layer becomes larger than the external shape of said article in the processing chamber when it absorbs water.
3. In a method for installing a protecting layer for plasma processing apparatus to be provided on the outer surface of an article in the processing chamber of a plasma processing apparatus, the improvement wherein said protecting layer is formed of a plasma-resistant and water-absorbing resin material and allowed to absorb water to be swollen, and the article in the processing chamber is inserted into the protecting layer, after which water is evaporated from

said protecting layer by heating to shrink said protecting layer, whereby the protecting layer is fixed to said article.

4. In a method for installing a protecting layer for plasma processing apparatus to be provided on the outer surface of an article in the processing chamber of a plasma processing apparatus, the improvement wherein said protecting layer is formed of a plasma-resistant and water-absorbing resin material and allowed to absorb water to be swollen, and the article in the processing chamber is inserted into the protecting layer, after which water contained in said protecting layer is evaporated while keeping said protecting layer at a pressure lower than atmospheric pressure, to shrink the protecting layer, whereby the protecting layer is fixed to said article.

5. In a plasma processing apparatus in which a workpiece is treated by creating a plasma in a processing chamber, the improvement wherein a protecting layer formed of a plasma-resistant and water-absorbing resin material comprising a polymeric material having a relationship between relative dielectric constant κ_e and thickness t (μm) of $t/\kappa_e < 300$ is adhered and fixed to the outer surface of an article in said processing chamber by its swelling and then shrinkage to prevent electrical insulation of the plasma and the article from each other.

6. In a plasma processing apparatus in which the

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creation of a plasma and the control of energy for the introduction of ions into a workpiece are independently carried out, the improvement wherein one or more surfaces made of a grounded metal electric conductor which come into contact with said plasma in the plasma processing chamber of the apparatus are coated with a plasma-resistant polymeric material having a relationship between relative dielectric constant $k\epsilon$ and thickness t (μm) of $t/k\epsilon < 300$.

7. A plasma processing apparatus according to Claim 6, wherein said plasma-resistant polymeric material is formed on the inner surface of said plasma processing chamber by spraying or coating.

8. A plasma processing apparatus according to Claim 6, wherein said plasma-resistant polymeric material is formed into a cylindrical liner whose outside diameter is larger than the inside diameter of said plasma processing chamber.

9. A plasma processing apparatus according to Claim 8, wherein a silicone resin is located on the periphery surface of said cylindrical liner, and said cylindrical liner is closely attached to the inner surface of said plasma processing chamber through the silicone resin.

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